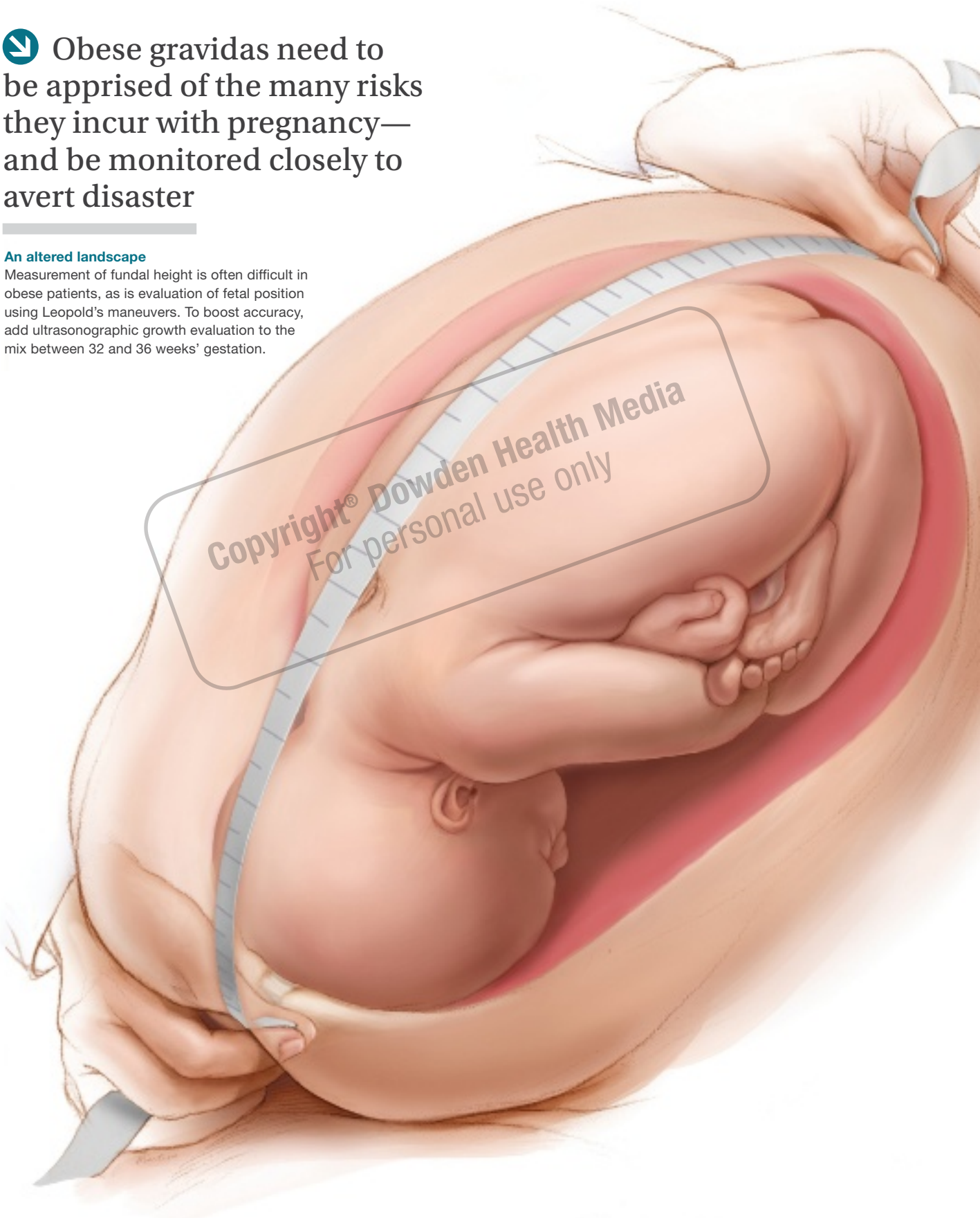
Obese gravidas need to be apprised of the many risks they incur with pregnancy—and be monitored closely to avert disaster



An altered landscape
Measurement of fundal height is often difficult in obese patients, as is evaluation of fetal position using Leopold's maneuvers. To boost accuracy, add ultrasonographic growth evaluation to the mix between 32 and 36 weeks' gestation.

» PART 1 OF 2

For the obese gravida, try strong counseling and close follow-up

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The authors report no financial relationships relevant to this article.

CASE

Obesity + coexisting conditions = complicated pregnancy and delivery

A 30-year-old gravida 8 para 5026 is referred from the clinic for evaluation of elevated blood pressure at 36 4/7 weeks' gestation. She is morbidly obese, with a weight of 440 lb and a body mass index (BMI) of 67. She also has a history of chronic hypertension and was recently given a diagnosis of gestational diabetes, which has been controlled through diet.

Her reproductive history includes four full-term vaginal deliveries followed by cesarean delivery for malpresentation of twins. Her blood pressure is 180/100 mm Hg, and she has new-onset proteinuria (3+) and a headache. The diagnosis? Preeclampsia superimposed on chronic hypertension.

Induction of labor is initiated using a Foley bulb and oxytocin, and magnesium sulfate is given to prevent seizures. Over the next 48 hours there is minimal cervical change, and the patient develops chorioamnionitis, for which she is given intravenous antibiotics. A repeat cesarean delivery is performed via a Pfannenstiel skin incision. The surgery is uneventful, and the infant is healthy.

Are further complications likely?

Yes—additional complications are considerably more likely in this scenario than in one involving a patient of normal weight, especially given the patient's chronic hypertension and gestational diabetes. Obesity can affect all aspects of pregnancy, from conception through the postpartum period, with the potential for

IN THIS ARTICLE

significant adverse maternal and fetal outcomes, including maternal mortality.

As the number of obese women of reproductive age increases, obstetricians face new challenges in the management of complications during pregnancy, labor, delivery, and beyond. In Part 1 of this two-part article, we offer advice on how to counsel the obese patient about the very real risks she faces in pregnancy, and detail trimester-specific recommendations. In Part 2, which follows *on page 51*, we offer practical management strategies during intrapartum, intraoperative, and postpartum periods.

CASE CONTINUED

The patient becomes febrile and hypoxic on postoperative day 1. When a computed tomography scan fails to rule out pulmonary embolism, she is started on heparin.

On postoperative day 7, omentum is detected at the incision, and the patient is taken to the operating room, where fascial dehiscence is identified and necrotic tissue is debrided. Two days later, a wound vac and inferior vena cava filter are placed.

The patient is discharged to a rehabilitation center on postoperative day 22.

FAST TRACK

The most important strategy to prevent obesity-related complications is prepregnancy weight loss of 10% of body weight over 6 months

Management starts before conception

The most important strategy to prevent complications associated with obesity and pregnancy is prepregnancy weight loss. Ideally, all obese patients should have a prepregnancy consultation that includes the recommendation to lose weight before conception. At this consultation, the ObGyn should determine the patient's BMI and risk category and advise her of the relevant maternal and fetal risks (**TABLE 1**). Weight-loss goals should be established for women who have a BMI above 30, as well as for those who have a BMI of 25 to 29.9 with additional risk factors such as hypertension, diabetes, dyslipidemia, and sleep apnea.

A reasonable goal is loss of 10% of body weight over 6 months, at a rate of 1 to 2 lb each week.[1] This should be accomplished through dietary changes and physical activity. A limit of 1,200 to 1,600 kcal/day is practical.[1] In addition, the Centers for Disease Control and Prevention (CDC) recommends 30 minutes of moderate to intense physical activity most days of the week.[2] Obese patients also should be referred to a nutritionist or dietician for education about dietary changes.

TABLE 1 What body mass index says about a person's weight

If a woman's BMI is…	…she is classified as
18.5–24.9	Of normal weight
25–29.9	Overweight
30–34.9	Obese (class I)
35–39.9	Obese (class II)
≥40	Morbidly obese (class III)

Based on the World Health Organization international classification of adult weight according to BMI. Available at www.who.int/bmi/index.jsp?introPage=intro_3.html.

Drug therapy can be a useful adjunct

Patients who have a BMI above 30 and who have not lost weight through diet and physical activity alone may benefit from pharmacotherapy. The US Food and Drug Administration (FDA) has approved two drugs for weight-loss therapy:

- sibutramine inhibits serotonin and norepinephrine uptake, thereby reducing appetite and increasing satiety
- orlistat decreases fat absorption by inhibiting pancreatic and gastrointestinal lipases.[1]

Neither drug is recommended **during pregnancy**.

Some women benefit from bariatric surgery

Weight-loss surgery is becoming an increasingly popular strategy in patients who have a BMI above 40 and in those who have a BMI above 35 with severe medical comorbidities. These patients should be referred to a bariat-

ric surgeon for evaluation and surgery prior to conception. (See "Bariatric surgery may afford some prepregnancy relief" *on page 48.*)

Look for common comorbidities

Assess the patient for medical comorbidities that are common when obesity is present. These include hypertension, dyslipidemia, impaired glucose tolerance, gallstones, osteoarthritis, endometrial hyperplasia, nonalcoholic fatty liver disease, and sleep apnea. Medical management should be optimized before conception, if possible.

Patients also should be encouraged to begin a prenatal vitamin and take 4 mg of folic acid daily before conceiving.

Trimester-specific strategies

First trimester

The first prenatal visit should focus on dating the pregnancy and confirming viability of the fetus, as well as counseling the patient on the risks of obesity in pregnancy. Weight-gain goals should also be articulated.

Dating the pregnancy. Obese women are more likely to be anovulatory and have irregular cycles, so the utility of determining the last menstrual period in establishing gestational age is limited. To increase the accuracy of dating, ultrasonographic (US) assessment should be performed in the first trimester.

Accurate dating is especially important for management during the later trimesters because iatrogenic preterm delivery may sometimes be indicated, depending on comorbidities.

The US evaluation also can be used to confirm viability. In one study, women who had a BMI above 30 were three times as likely to experience early or recurrent miscarriage.[3]

Assessing comorbidities. After the patient is weighed and her blood pressure has been measured, diabetes screening is recommended if it has not been performed recently. A glucose challenge test can identify patients who have underlying but undiagnosed type 2 diabetes. In addition, a baseline 24-hour urine collection to assess for proteinuria can be useful later in pregnancy to differentiate preeclampsia from underlying renal disease and chronic hypertension.

TABLE 2 Recommendations for weight gain during pregnancy, by BMI

If BMI is…	…weight gain should be
<18.4	28–40 lb
18.5–24.9	25–35 lb
25–29.9	15–25 lb
≥30	At least 15 lb

Source: Institute of Medicine[4]

Discussing risks. This conversation should include information on the increased risk of fetal anomalies, gestational diabetes, preeclampsia, macrosomia, stillbirth, induction of labor, and cesarean delivery.

Weight-gain recommendations. There has been a significant increase in birth weight over the past decade. The main cause is maternal obesity, but a rising incidence of diabetes and diminishing rate of maternal smoking have also contributed.

Today, more than 40% of American women gain more than the recommended amount during pregnancy. With the continuing rise in obesity, initial guidelines for pregnancy weight gain (which were implemented to prevent growth restriction), as developed by the Institute of Medicine in 1990, may need to be changed (**TABLE 2**).[4] Although the current guidelines for obese women recommend a weight gain of at least 15 lb, we recommend only a 10-lb weight gain for gravidas who have a BMI above 30.

Second trimester

Screening for gestational diabetes. The risk of gestational diabetes increases with BMI. Doherty and colleagues found a sixfold increased risk of gestational diabetes in women who had a BMI above 30, compared with subjects of normal weight.[5] Even if early glucose screening is performed, testing should be repeated between 26 and 28 weeks' gesta-

FAST TRACK

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Obesity is a global threat

Obesity has become a global epidemic and a public health crisis. The World Health Organization has called it a major killer and likened it to malnutrition and HIV.

In 2005, 1.6 billion adults worldwide were overweight (body mass index [BMI] >25), and 400 million were obese (BMI >30). These numbers are expected to exceed 2.3 billion and 700 million, respectively, by 2015.[12]

In the United States, the percentage of the population that is obese has increased dramatically over the past 15 years—a trend that is expected to continue. According to the Centers for Disease Control and Prevention (CDC), approximately one third of the US population was obese in 2005 and 2006, age and gender notwithstanding. The severity of obesity also is rising, with significantly more people having a BMI >35 than in the previous 25 years.[13]

How metabolic syndrome is defined in women*

Parameter	Criteria (presence of ≥3 indicates metabolic syndrome)
Waist circumference	≥88 cm
Glucose level†	Diabetes or fasting plasma glucose level ≥110 mg/dL (6.11 mmol/L)
Blood lipid levels	
High-density lipoprotein	<50 mg/dL (1.3 mmol/L)
Triglycerides	≥150 mg/dL (1.7 mmol/L)
Blood pressure	≥130/85 mm Hg

*According to the National Cholesterol Education Program Adult Treatment Panel III (ATP III)
†Revised ATP III criteria include fasting plasma glucose level ≥100 mg/dL.

Metabolic syndrome is increasing

The rise in obesity has been followed by increasing rates of multiple medical conditions associated with it—both in the general population and among obstetric patients. One of the most troubling developments is an increase in the rate of metabolic syndrome, which affects 47 million Americans. Metabolic syndrome increases the risk of cardiovascular disease and diabetes and is characterized by the constellation of abdominal obesity, dyslipidemia, glucose intolerance, and hypertension.[14]

Risk factors for metabolic syndrome in women include:

- pregnancy-related weight gain
- oral contraceptive use
- polycystic ovary syndrome
- gestational diabetes
- preeclampsia
- menopause.

As ObGyns, we have an obligation to counsel patients about the risks of obesity and to manage their obesity and comorbidities or refer them to a specialist. Obese patients are at risk of developing metabolic syndrome-like complications during pregnancy.

FAST TRACK

A BMI above 29 appears to double the risk of neural tube defects

tion to identify women who may have developed gestational diabetes.

Screening for fetal anomalies. A detailed anatomic US assessment is recommended at approximately 20 weeks of gestation because the risk of congenital anomalies is increased in the offspring of obese women. A BMI above 29 appears to double the risk of neural tube defects and to slightly increase the risk of heart defects, anorectal atresia, limb-reduction defects, hypospadius, diaphragmatic hernia, and omphalocele. Interestingly, obesity appears to protect against gastroschisis.[6]

Third trimester

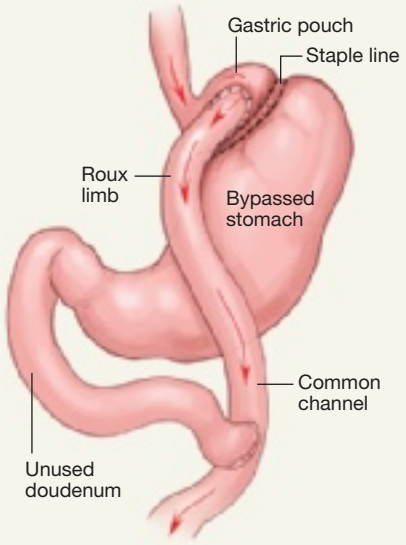
Monitor for development of preeclampsia. Blood pressure monitoring is paramount during this trimester because obese women are at increased risk of developing pre-

Bariatric surgery may afford some prepregnancy relief

Bariatric surgery is an increasingly popular method of weight loss, particularly in women of reproductive age. The two main types of bariatric surgery are the Roux-en-Y gastric bypass and the laparoscopic adjustable gastric band.

Both procedures are associated with complications, although they are rare. Malabsorptive procedures can be associated with nutritional deficiencies, and restrictive procedures are associated with band erosion and gastrointestinal hemorrhage.

Roux-en-Y procedure



In the Roux-en-Y procedure, the stomach is stapled to produce a small pouch. The distal jejunum is attached to this pouch, bypassing the stomach and duodenum.

Gastric banding

In gastric banding, a silastic band placed around the top of the stomach limits the amount of food the stomach can hold. The band is attached to a subcutaneous pump to allow for adjustment.

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FAST TRACK

For every 5 to 7 kg/m² increase in prepregnancy BMI, the risk of preeclampsia doubled

eclampsia. A meta-analysis of 1.4 million women showed that, for every 5 to 7 kg/m² increase in prepregnancy BMI, the risk of preeclampsia doubled.[7] The risk rises further if other confounders such as diabetes are present.

At each visit, the patient should have blood pressure measured and undergo urinalysis for proteinuria.

Fetal growth assessment by measurement of fundal height is often difficult in obese patients, as is evaluation of fetal position using Leopold's maneuvers. Therefore, US growth evaluation should be performed at least once during the third trimester, between 32 and 36 weeks of gestation.

Even after adjustment for gestational diabetes, women who have a BMI above 25 appear to have twice the risk of carrying a macrosomic fetus as women who have a BMI in the normal range.[8]

Anesthesia consultation. Obese women—especially those who are morbidly obese—should be referred for anesthesia

6 pearls when the gravida has had bariatric surgery

Bariatric surgery is a reasonable option for a morbidly obese woman who has comorbidities before attempting to conceive. To date, however, we have few data on pregnancy outcomes following this surgery.

A prospective study evaluating pregnancy outcomes following laparoscopic adjustable banding found significantly diminished weight gain and a reduced risk of gestational diabetes and hypertension in women undergoing surgery, compared with obese women who did not undergo surgery.[15] Interestingly, these findings were not associated with a decrease in birth weight. This suggests that the risk of neonatal complications does not rise following maternal bariatric surgery, and pregnancy outcomes appear to be improved.

Nevertheless, the obstetrician should take several considerations into account when caring for a woman who has undergone bariatric surgery.[16]

1 Advise delaying pregnancy

After bariatric surgery, a woman should delay pregnancy for 12 to 18 months, or during the period of most rapid weight loss, to minimize the risk of fetal growth restriction.

2 Encourage contraception

The patient should be advised of the risk of unplanned pregnancy. Before surgery, obese women are often anovulatory; rapid weight loss can bring a rapid return to fertility. Appropriate contraception should be offered.

3 Look for nutritional deficiencies

Women who have undergone bariatric surgery—especially malabsorptive procedures—should be evaluated for nutritional deficiencies. Calcium, folate, iron, and vitamin B_{12} deficiencies are common, and supplementation is often necessary.

4 Coordinate her care

Care during pregnancy should be coordinated with the bariatric surgeon. This is especially true if the patient had laparoscopic banding, because the band may need to be adjusted during pregnancy.

5 Avoid glucose tolerance test drinks

The 50-g glucose challenge test can cause symptoms of dumping syndrome, with abdominal pain, distension, and diarrhea, in women who have undergone bariatric surgery. These symptoms are secondary to the high glucose load.

Avoid the Glucola test in these patients. Check a fasting and 1-hour postprandial glucose level instead.

6 Monitor fetal growth

Fetal growth should be carefully monitored in women who have undergone bariatric surgery, especially if there was a short interval between surgery and pregnancy or the patient is still rapidly losing weight.

Fundal height should be assessed at each prenatal visit, and a growth sonogram should be obtained at least once in the third trimester.

consultation before delivery. Obesity has been shown to contribute to anesthesia-related maternal mortality,[9] and spinal and epidural anesthesia can be challenging secondary to body habitus. Loss of anatomic landmarks can make identification of the epidural space difficult. In addition, catheters can become dislodged, and multiple attempts at placement may be necessary. Epidural placement may fail in up to 42% of morbidly obese women.[10]

During the anesthesia consultation, women should be apprised of the very real possibility that general anesthesia will be needed in the event of cesarean delivery, as well as the risks involved.

FAST TRACK

Check for nutritional deficiencies in women who have undergone bariatric surgery, especially malabsorptive procedures

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In the general population, intubation fails in 1 of every 2,230 patients; in the obstetric population, the rate is 1 in 230, regardless of weight. In morbidly obese patients, intubation may fail in 15% of cases.[10]

Antenatal fetal testing. Because of an increased risk of stillbirth in obese women, weekly biophysical profiles or twice-weekly nonstress tests may have some utility in the third trimester, although antenatal testing has not been studied in this context.

In a study involving 1.4 million patients, the likelihood of stillbirth increased 40% in obese women.[11] The risk appears to increase with BMI. Obese black women had a higher risk of stillbirth than their white counterparts, with odds ratios of 11.4 and 7.8, respectively.[11]

Although the cause of the elevated risk of stillbirth is unknown, placental dysfunction and abnormal fat accumulation are thought to contribute.

In Part 2 of this article, which immediately follows on page 51, we take up intrapartum and postpartum concerns.

FAST TRACK

The likelihood of stillbirth increased 40% in obese women

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